

Restricted Water Use During Chlorination

The following information should be provided to building occupants after chlorine has been introduced into the water system:

1. ***Do not drink the water and avoid all body contact.***
2. Water use should be minimized to assure that chlorine remains in the well during the minimum contact period.
3. If strong chlorine odors are detected, ventilate the effected area immediately, and minimize exposure to the fumes.
4. Avoid doing laundry, filling fish tanks, watering plants and using water for other purposes where the chlorine may have an adverse effect.

The following page contains a suggested form entitled "Well Disinfecting & Sampling Notice" for use in advising homeowners of chlorination procedures and precautions.

Well Disinfection and Sampling Notice

YOUR WELL WAS DISINFECTED on _____ at _____ A.M./P.M with a chlorine bleach solution.

Well disinfection is a standard practice required by the Michigan Water Well Construction Code when a new well is completed or an existing well is serviced. The chlorine disinfectant is a safety measure to kill any bacteria introduced during well construction or repair.

DO NOT USE THE WATER FOR DRINKING, COOKING, OR BATHING UNTIL THE DISINFECTANT HAS BEEN COMPLETELY FLUSHED OUT AND A SAFE COLIFORM BACTERIOLOGICAL WATER TEST HAS BEEN OBTAINED. HIGH CHLORINE CONCENTRATIONS SHOULD NOT BE CONSUMED AND CAN CAUSE SKIN IRRITATION.

We ask that you avoid using large quantities of water (such as laundry or lawn watering) for at least the next 10 hours to ensure that the chlorination is effective and to avoid possible household problems:

- ☐ We were unable to access your house to disinfect your plumbing system.
- ☐ Please disinfect the plumbing by running water at each plumbing fixture until you can smell chlorine.

After **10** hours the chlorine should be pumped from the well. Do not discharge the water to a surface water body (a lake or stream) or to your septic tank or sewer system.

State regulations require that before placing a new, repaired, or reconditioned water well into service, and after all traces of chlorine are pumped from the well, a water sample shall be collected and found to be free of coliform bacteria (common in intestines of warm-blooded animals).

Well owners are responsible for collecting the sample or arranging for sample collection.

- ☐ Please contact your local health department to have your water tested.
- ☐ We will collect a bacteriological water sample at your request. Please call our office to arrange a time.
- ☐ We have left a water sample bottle for you to collect a water sample for coliform analysis. Please collect a sample 48 hours after all traces of chlorine have been pumped from the system, using the instructions provided. Submit the sample to the laboratory. You will receive a copy of the test results.e



STAMP OR ATTACH BUSINESS CARD

WATER SAMPLING FOR COLIFORM BACTERIA

General

Collecting a water sample for laboratory analysis is the most practical way of determining the suitability of a water supply for drinking purposes. Water sampling is particularly important for a newly constructed or repaired water supply, because of the likelihood that contaminants may have been introduced during construction or repair.

Who Should Sample

For newly constructed wells, the well owner needs to assure that a water sample is collected for bacteriological quality before well use. However, it's recommended that water samples be collected by a well drilling contractor, public health official, laboratory personnel or other individual familiar with proper sampling techniques.

An individual should consult their local health department to get information on sampling protocol, where to get sampling containers and available laboratories.

Types of Sampling

1. Bacteriological sampling uses coliform bacteria as an indicator organism. Two excellent sources of information about coliform bacteria and their use in drinking water analysis are found in the list of references (Cullimore, 2000 and Edberg, S.C et. al., 2000):
2. General chemical sampling gives an overview of the aesthetic quality of the water and suitability as a drinking water source. The elements or compounds typically analyzed include including hardness, iron, chloride, sodium, fluoride, sulfate, nitrate, and nitrite.
3. Specialized chemical sampling is available to detect heavy metals, volatile organic hydrocarbons, pesticides and other contaminants. These samples are collected to identify a suspected site of contamination or to diagnose a water quality problem.

The bacteriological and general chemistry sampling are the most common types of sampling for both new well construction and monitoring of existing wells. Sampling for other water quality parameters is performed on a case by case basis at the discretion of the local health department or request of the well owner.

Only sampling for coliform bacteria will be addressed in this manual.

Sampling for Coliform Bacteria Analysis - Sampling Locations

Water samples for bacteriological analysis are most often collected from one of three locations:

The sampling tap at the pressure tank. The sampling tap at the pressure tank is used to determine water quality from the source of the water. A water sample from this tap tests the sanitary integrity of the aquifer, well, pump, pressure tank and piping between the well and the pressure tank. Generally, there is no influence from water treatment units or distribution system piping when the pressure tank sampling tap is used.



Typical sampling tap

Kitchen sink. A water sample from the kitchen sink checks the bacteriological quality of the entire water supply system, including the aquifer, well, pump, pressure tank, piping, and any water treatment equipment. This sink is most often used because it is the tap that gets the most use in a household. Most of the water used for drinking and food preparation comes from this tap.

If the kitchen sink tests positive for coliform bacteria, follow-up samples should be collected from both the kitchen sink and from the sampling tap at the pressure tank. This will help identify the source of the coliform bacteria.



Outside faucets are sometimes used as sampling locations

Outside faucet. A faucet on the outside of the house is sometimes used for collecting a water sample for coliform analysis because inside of the house is inaccessible during the sampling visit, or no other untreated sample tap is available.

Outdoor faucets are not the best sampling location. They are exposed to contamination by insects, rain, snow, and dust. They do not get routine, frequent use and most are threaded.

By using proper sample tap preparation, an outdoor faucet can be an adequate sampling location. First, clean the threads with a disinfectant such as an alcohol wipe or a clean cloth soaked in a chlorine solution. A spray bottle with a concentrated chlorine solution may also be used if the threads are clean. Then flush the tap in a wide open position for at least 5 minutes. If water accumulation is a problem around the base of the tap, use a hose to divert water away while flushing. Remove the hose and again clean the threads on the tap and briefly flush before sampling.



The kitchen sink is most often used for sampling

Sampling for Coliform Bacteria Analysis - Desirable Sampling Tap Characteristics:

1. The sampling tap is in a clean location.
2. The tap is in frequent use.
3. The flow of water from the tap is easily controlled.
4. A uniform, straight stream of water comes out of the tap.
5. The tap is located where it may be flushed as part of the sampling procedure.
6. The tap location is easily accessible.
7. The sample bottle may easily fit under the tap.
8. Cold water only, i.e., not from a tap that blends hot and cold water.

Sampling for Coliform Bacteria Analysis – Sampling Taps to Avoid, if Possible (from Bacteriological Sampling, 1988)

1. Taps with swivel/swing type spouts



2. Faucets with leaks around the valve stem.



3. Taps with leaks around the base of the spout.



4. Taps with aerators or other accessories (such as filters) attached to the spout, unless they are removed before sampling.



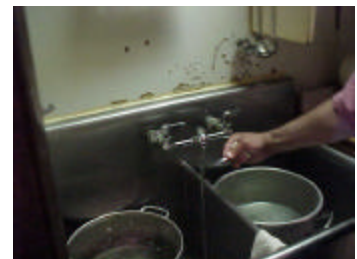
5. Taps located in areas that are not cleaned or maintained.
6. Taps that are subject to splash or contamination.



Example: Pot and pan washing sink in a restaurant kitchen or a janitor's mop sink.



7. Taps with threaded bibs.
8. Taps that do not have a uniform stream of water.
9. Mixing (hot and cold) faucets.



10. Frost free hydrants with buried stop and waste valves
11. Faucets that were recently installed or repaired, and have not yet been treated with chlorine.



Sampling Taps at the Pressure Tank.

Michigan's Well Construction Code minimum requirements for the sampling tap at the pressure tank are as follows:

1. Must be in a convenient location.
2. Must be installed at the pressure tank or as close to the well as possible.
3. Must be at least 8 inches above the floor.
4. Must be down turned.

However, it is suggested that the following design criteria also be considered to make the use of the sampling tap more practical:

1. The tap should terminate at least 18 inches above the floor. This allows for placing a 5 gallon bucket under the tap when flushing prior to sampling. This is particularly helpful in homes with a finished basement without a nearby floor drain.



2. Use a smooth bore sampling tap. This allows for a uniform stream of water.



3. Consider the installation of two taps. One is threaded to allow the draining of the pressure tank and distribution system with the use of a hose and one is unthreaded for use as a sampling tap.

Crawl Space Installation of Sampling Taps

Pressure tanks are sometimes installed in crawl spaces. A tap installed at a pressure tank located in a crawl space should not be used as a point to collect samples for coliform bacterial analysis. Crawl spaces are “confined spaces” and special precautions (in accordance with the Michigan Occupational Health Standards, Part 90 and Part 490) must be taken before entering.

For crawl space tank installations, it is suggested that a faucet be installed outside the crawlspace wall directly adjacent to the pressure tank. Although outside taps are not the best for sampling purposes, it can be easily flushed and is conveniently located. It is better than having the sampling tap in the crawl space. A tap should still be installed at the pressure tank in these cases to drain the pressure tank and/or distribution system.



This tap cannot be easily flushed, is not conveniently located, and is not in a clean area.

Coliform Bacteria Water Sample Collection Procedures

1. Select the sampling location

The sampling location selected should reflect the quality of water coming from that portion of the water supply being evaluated. For example, if the well itself is being evaluated, do not use a sampling location out in the distribution system. Use the sampling tap closest to the wellhead or at the pressure tank.

Review the sections on sampling locations and sample taps presented earlier.

2. Aerators

Many taps on sinks have aerators on the end of the spout. Aerators break up the flow of water by allowing air bubbles to mix with the water. The air may “freshen” the water and increase the volume (not quantity) of the water as it leaves the tap. But should the aerators be left on, or taken off while sampling?

- ❖ If the purpose of the sampling is to evaluate what the user of the water supply may be exposed to during normal use, then the aerator should not be removed (i.e., routine monitoring). The user typically does not remove the aerator prior to getting a glass of water to drink.

- ❖ If the sample being collected is a follow up to an earlier positive sample, it is desirable to eliminate as many sources of potential contamination as possible. Removing the aerator eliminates one possible contaminant source.



If an aerator is removed, the end of the sampling tap/spout must be cleaned with an alcohol swab or a clean cloth soaked in a chlorine solution, and the tap then thoroughly flushed before sampling.



3. **Clean and disinfect the sampling tap.** Using an alcohol wipe or a clean cloth soaked with chlorine, wipe off the exterior surfaces at the tip (discharge point) of the sampling tap, with particular attention to cleaning any threads or other grooved or rough surfaces.

The use of heat to disinfect a sampling tap is not recommended. Heat may damage nonmetal components and the thin plating present on many fixtures. Sometimes it is difficult to distinguish a plastic faucet from a metallic faucet.



4. **Flush the sampling tap and distribution system.** Flush the distribution system by turning on faucets at the kitchen sink, bathroom sinks, bathtubs, and laundry sink, and flushing each toilet at least once. Leave these faucets running until after the water

sample has been collected.

Turn on the tap selected for sampling, usually the kitchen sink, to the maximum extent possible (splash may be a problem and should be avoided), and let the water run for at least 5 minutes.



Flush for at least one pump cycle (i.e., the time from pump start to stop). For a conventional single family home this is usually about 5 to 10 gallons of water or at least 5 minutes of flushing time.



Flush until the water is as cold as it will get. This suggests that the water being delivered has not been in the pipes or storage tank for any extended length of time. Extending the flushing time and maximizing the flow of water during flushing, will reduce the possibility that the distribution system or sampling tap are the cause of a positive sample.

5. **Reduce the flow of water before collecting the sample.** Reduce the flow of water at the sampling tap to a steady stream with no splash occurring. This will allow for a controlled filling of the water sample container.
6. **Collect the water sample.** Use only sterile containers specifically prepared and designated for collecting water samples for coliform bacteria analysis. If the cap of the sampling container is loose or dropped, or if the integrity of the sample container is in question, discard the sample container.



Leave other faucets running until samples have been collected.



Chlorine residual is still present.

inactivates any chlorine which may still be present in the water.

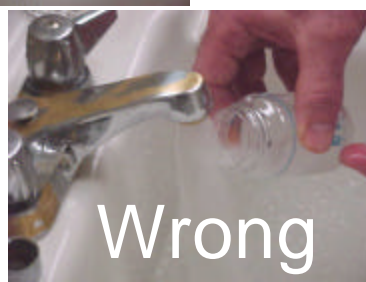
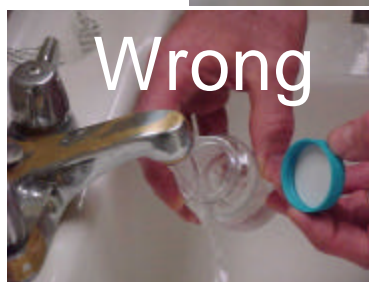
Remove the seal and cap from the sample container and hold the cap in your hand, facing downward. Do not touch the rim or inside of the cap or sample container. Do not set the cap on any surface.

If the water supply system has been recently treated with chlorine, use a chlorine test kit to assure that no chlorine residual is present. If chlorine residual is present the water supply system needs further flushing before a sample is collected.

Do not rinse the sample container. The container is treated with sodium thiosulfate, which



Collect the water sample immediately after removing the cap. Keep the stream of water from the tap completely inside the mouth of the sample container.



Fill the sample container to the designated 100 milliliter line. Do not allow the sample container to overflow.





Tightly recap the sample container immediately after collecting the water.

7. **Shake the sample container.**
Gently and briefly shake the sample container to dissolve the sodium thiosulfate tablet or residue in the container, if present.



8. **Turn off all water faucets.**
9. **Clean and replace the aerators.**
10. **Complete the water sample report form.**
11. **Promptly mail or deliver the water sample to a state certified laboratory for analysis.**

Interpretation of the Results of Water Sample Analysis (Prepared for distribution by the Michigan Department of Environmental Quality Drinking Water Laboratory).

Bacteriological Analysis:

Evaluation of the bacteriological quality of drinking water is done using “coliform” testing. Coliform bacteria are found in the intestinal tract of warm-blooded animals, surface water, some soils, and decaying vegetation. Coliform bacteria are used as “indicator” organisms. If they are present, pathogenic, or disease-causing organisms, could be present. The Michigan Department of Environmental Quality (MDEQ) laboratory and many private laboratories use the “defined substrate method.” A positive result may indicate that a water supply is not properly protected from contamination. The “defined substrate method” also detects *E. coli*, an organism that always originates from mammal or bird intestinal tracts. If *E. coli* is detected, it is more likely that the water supply may contain disease-causing organisms resulting from fecal contamination.

Result Code	This means:
ND	“Not Detected” – No coliform organisms were detected in the water sample. The sample met the state drinking water standard for bacteriological quality at the time of sampling. (Similar results may be reported as negative; absent; or zero, “0”.)
POS	“Positive” – Coliform organisms were present in the water sample. Safety cannot be assured. Collection of a resample to confirm the original result is recommended. An investigation into the cause of the problem by a qualified individual is advised. (Similar results may be reported as present or any number from 1 to 200.)
EC-POS	“<i>E. coli</i> detected” – <i>E. coli</i> organisms were detected in the water sample. <i>E. coli</i> organisms are found in the intestines of warm-blooded animals, and as such, their presence in a water supply is considered an indication of sewage contamination. Precautions are recommended in the use of the water supply. These results are the same as fecal coliform positive; however, <i>E. coli</i> results indicate sewage contamination with more certainty. An investigation into the cause of the problem by a qualified individual is advised.

COMMENTS Coliform organisms may die during sample holding time (time from collection to testing). The laboratory will comment that results may not be representative or valid if sample holding time is longer than 48 hours. The federal standard for a coliform holding time limit for public water supplies is 30 hours.

**Michigan's Well Construction Code (MWCC) Requirements
Relating to Well Disinfection**

(Excerpts from Part 127, 1978 PA 368, as amended, and Administrative Rules)

MWCC Requirements on Well Development

R 325.1639 (1)(Rule 139) A water supply well that is installed in unconsolidated sand and gravel aquifers shall ordinarily be fitted with a screen that has openings which are properly sized so that the aquifer can be properly developed to produce sand-free water at the pumping rate of the permanent pump.

R 325.1639 (5)(Rule 139) A new, repaired, or reconditioned well shall be developed and pumped to waste at a pumping rate which equals or exceeds that of the permanent pump, until the water is as clear as is reasonably possible considering the groundwater conditions in the area. The permanent pump shall not be used to develop the well without the owner's consent.

MWCC Requirements on Flushing

R 325.1639 (5)(Rule 139) A new, repaired, or reconditioned well shall be developed and pumped to waste at a pumping rate which equals or exceeds that of the permanent pump, until the water is as clear as is reasonably possible considering the groundwater conditions in the area. The permanent pump shall not be used to develop the well without the owner's consent.

MWCC Requirements on Chlorination

R 325.1661, (Rule 161) Disinfection of well and pumping equipment

(4) After thoroughly pumping to waste pursuant to the provisions of R 325.1639(5), a well and pumping equipment shall be disinfected with chlorine that is applied to obtain a chlorine concentration and minimum contact period specified in table 5 in all parts of the water supply system before pumping the well to waste and flushing out the chlorine solution. A well drilling contractor or pump installer shall be responsible for chlorinating that portion of the water supply system on which work has been performed.

**TABLE 5
MINIMUM CHLORINE CONCENTRATION AND CONTACT TIME**

Amount of Chlorine Added to 100 Gallons of Water			
Chlorine Concentration (Parts per Million)	Gallons of 5.25% Sodium Hypochlorite (Liquid Bleach)	Pounds of Dry Calcium Hypochlorite (Granular)	Minimum Contact Time
100 ppm	¼ gallon	0.14 lbs	10 hours
250 ppm	½ gallon	0.35 lbs	4 hours
500 ppm	1 gallon	0.70 lbs	2 hours
1000 ppm	2 gallons	1.40 lbs	1 hour

R 325.1639, Rule 139 (Excerpts)

(5) A new, repaired, or reconditioned well shall be developed and pumped to waste at a pumping rate which equals or exceeds that of the permanent pump, until the water is as clear as is reasonably possible considering the groundwater conditions in the area. The permanent pump shall not be used to develop the well without the owner's consent.

- (8) Water that is used for drilling purposes, other than water from the well itself, shall be potable water that contains a free chlorine residual of not less than 10 parts per million at the time of use and shall be conveyed in containers that are clean and capable of being maintained in a clean condition. Surface water shall not be used for drilling purposes unless it is obtained from a municipal water supply system.
- (9) When chlorine is placed into a water supply system pursuant to the provisions of R 325.1661 or when well rehabilitation chemicals are used, the well drilling contractor or pump installer shall provide notification to the well owner or building occupants or shall make the system inoperable during the treatment period.

R 325.1640, Rule 140

- (2) After January 1, 1994, a person shall not use the following water well components unless they are in compliance with or surpass ANSI/NSF standard 14, 60, or 61, ASTM specification C 150, or section 10 of API specification 10, as adopted by reference in R 325.1610:
 - (f) Chemicals that are used for the development, maintenance, treatment, disinfection, or rehabilitation of a water well, except for sodium hypochlorite or calcium hypochlorite.

Sodium hypochlorite and calcium hypochlorite are exempt from the certification requirement. Any other chemicals used in the treatment of a water supply must be certified.

MWCC Requirements on Water Sampling

R 325.1658, Rule 158 Pump Installation; sampling faucets

Provision shall be made for the collection of water samples by installing a down turned faucet, not less than 8 inches above the floor, in a convenient location at the pressure tank or as near to the well as possible.

R 325.1661, Rule 161 Disinfection of well and pumping equipment

- (2) Before placing a new, repaired, or reconditioned water supply system into service, and after all traces of chlorine have been flushed out, 1 or more water samples shall be collected from the sampling faucet. Organisms of the coliform group shall not be present in the sample or samples.
- (3) The water supply owner shall be responsible for collecting the water sample or shall arrange for the owner's designated representative to collect the sample. The well drilling contractor or pump installer shall notify the water supply owner of the owner's responsibility for collecting the water sample.
- (4) A well driller or pump installer is not required to rechlorinate a well or pump as a result of water samples that are collected from a location other than the sampling faucet required pursuant to the provisions of R 325.1658.

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